

Homework assignment 8A

1. According to the Federal Reserve System, 46% of U.S. households have credit-card debt. For a simple random sample of size $n = 30$, let \hat{p} be the proportion of households with credit-card debt. What is $\mathbb{E}[\hat{p}]$ and $\sigma_{\hat{p}}$? Determine the probability that: (a) At least 10 households have credit card debt (b) At most 12 households have credit card debt.
2. According to the Investment Company Institute, 40% of U.S. households have an Individual Retirement Account (IRA). Assuming the population proportion to be $= 0.40$ and that a simple random sample of 400 households has been selected:
 - What is the expected value of \hat{p} , the proportion in the sample having an IRA?
 - What is the standard error of the sampling distribution of the proportion?
 - What is the probability that at least 35% of those in the sample will have an IRA?
 - What is the probability that between 38% and 45% of those in the sample will have an IRA?
3. A simple random sample with $n = 300$ is drawn from a population in which $p = 0.4$. Determine the following probabilities for \hat{p} , the proportion of successes in this sample: $P[\hat{p} = 0.4]$, $P[\hat{p} > 0.35]$, $P[0.38 < \hat{p} < 0.42]$, $P[\hat{p} < 0.45]$
4. A population of 500 values is distributed such that $\mu = \$1000$ and $\sigma = \$400$. For a simple random sample of $n = 200$ values selected **without replacement**, what is $\mathbb{E}[\bar{X}]$ and $\sigma_{\bar{X}}$?

5. A civic organization includes 200 members, who have an average income of \$58,000, with a standard deviation of \$10,000. A simple random sample of $n = 30$ members is selected to participate in the annual fund-raising drive. What is the probability that the average income of the fund-raising group will be at least \$60,000?
6. A firm's receiving department has just taken in a shipment of 300 generators, 20% of which are defective. The quality control inspector has been instructed to reject the shipment if, in a simple random sample of 40, 15% or more are defective. What is the probability that the shipment will be rejected?